

Parasitic on the thallus of *Thelotrema lepadinum*, Ach., and on holly. Ingleby Park, Cleveland, Yorkshire! *Mr. W. Mudd.*

Thallus undistinguishable from that of the matrix, or a mere film on the bark of the holly. *Apothecia* apparently bursting through the bark, either singly or in groups of two or three together, stipitate, about $\frac{1}{4}$ of an inch high, of a rich dark-brown colour, more or less polished and shining. *Stipes* smooth. *Ex-cipulum* clavato-pyriform, truncate at the summit, and incurved at the round depressed orifice. *Disk* minute, dark brown. *Asci* linear. *Paraphyses* very long and slender. *Sporidia* eight, very large, elliptical, pointed at the extremities, generally rather broad, sometimes narrower and more elongated, of an umber-colour, 3-septate, the cells filled with round granules.

The immense sporidia preserve this as quite distinct from any other species of *Sphinctrina*.

This lichen we owe to the research of Mr. W. Mudd.

PLATE VIII. fig. 20. *Sphinctrina septata*, Leight., nat. size. Fig. 21. Apothecia, magnified. Fig. 22. Orifice of apothecium. Fig. 23. Section showing asci, sporidia, and paraphyses. Fig. 24. Sporidia, highly magnified. Fig. 25. Scale of magnitude of the sporidia only.

XI.—On the so-called "Water-vascular System." By THOMAS WILLIAMS, M.D., F.L.S., Physician to the Swansea Infirmary.

To the Editors of the *Annals and Magazine of Natural History*.

GENTLEMEN,

MY recent researches have convinced me that the ideas of naturalists with reference to the so-called "water-vascular system" in the Annulose and Radiated classes, as most probably in the entire subkingdom of the Invertebrated animals, must undergo a radical change.

Already, in another place, I have pointed out that the ciliated tubes in the Rotifera, to which this title has been given, have nothing whatever to do with water, unless the cavitary nutritive fluid be called by that name.

1. At one time I supposed that the convoluted cords described by Hollard, Frey and Leuckart, in the perivisceral spaces of *Actinia*, were in truth a rudimentary "water-vascular system." But I now believe that they have no relation whatever to such a system; that, on the contrary, they are *organs* upon which is engrafted the reproductive apparatus, and by which at the same time is fulfilled the function of discharging externally the fluid contained in the perivisceral cavity.

2. I am convinced from recent observations that the so-called "water-vascular system" (Siebold and others) of the Trematode

and Cestoid Entozoa, has no reference whatever to such a function; that in the latter animals the miscalled water-canals are really nutritive channels; that they are probably furnished with a suctorial and an excretory extremity; and that what has been described as the ciliated "water-tubes" in the Trematodes *do not carry water at all*, under any conditions or circumstances.

3. That in the entire family of the *Medusæ* there exists no structure which is entitled to be styled a water-vascular system.

4. That in the Echinodermata there is no system of vessels which *carries water, in the respiratory sense* of that phrase; that the contents of the *ambulacral system* are not pure water, but on the contrary a fluid drawn from the cavitory reservoir, and destined to be eliminated externally, like the contents of the vascular system of the Annelida; that from the analogy of all the facts now known, it is in the highest degree probable that the "*branchial tree*" of *Holothuria* is not branchial at all; and that it does not suck-in water from without under any circumstances.

5. That in the entire family of the Annelida no system of organs can be discovered which deserves to be called a water-vascular system.

There can be no doubt that the hæmosine and metallic compounds which accumulate in the vascular fluid system of this class prove that it is intended, where it is present, to fulfil, in an express manner, a *respiratory function*, and therefore corresponds with

6. The tracheal system of Insects.

But in the former instance the external aërating medium is not admitted *directly into* the vessels, as in the latter. This point is one of material difference. An *aërial-vascular system* is thus proved to exist, but *not a water-vascular one*.

7. I have not been able to prove in any instance among the Crustacea and Mollusca that *water* is directly and immediately admitted into *any one* of the systems of vessels or channels communicating with the *interior of the body*.

8. The preceding corollaries are founded upon a vast number of practical details (which will be published at length in my work on the Respiratory Organs), which have led me, step by step, to the conclusion that a *real "water-vascular system"* has no existence in any class of Invertebrated animals; and that really there is not a single example amongst the Invertebrata of that method of breathing which has been called "*internal aquatic respiration.*"

I remain, Gentlemen,

Your obedient Servant,

THOMAS WILLIAMS.

Swansea, Jan. 12, 1857.